FIG. 1

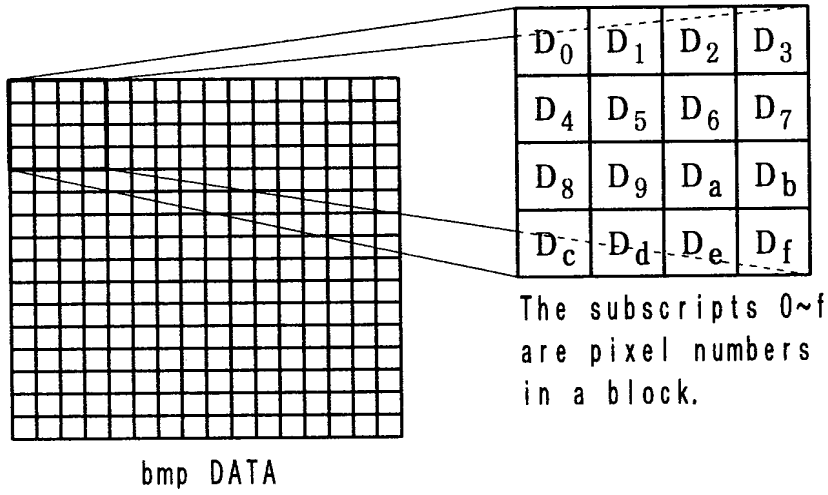

D0 D1 D2 D3
D4 D5 D6 D7
D8 D9 Da Db
Dc Dd De Df
The subscripts 0~f are pixel numbers in a block.
bmp DATA

FIG. 2

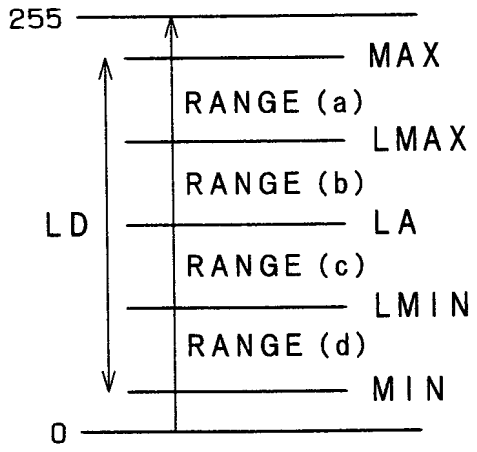

255
MAX
RANGE (a)
LMAX
RANGE (b)
LD
LA
RANGE (c)
LMIN
RANGE (d)
MIN
0

FIG. 3

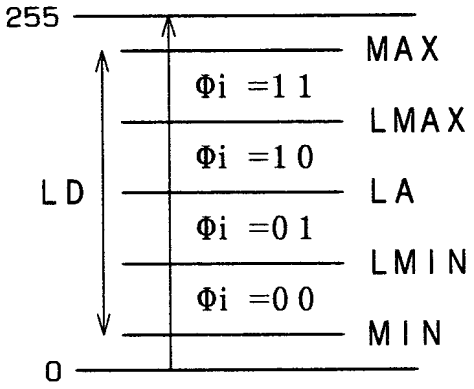

255
MAX
Φi =11
LMAX
Φi =10
LD
LA
Φi =01
LMIN
Φi =00
MIN
0

FIG. 4

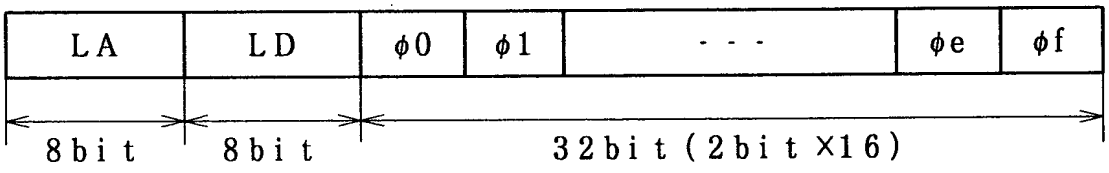
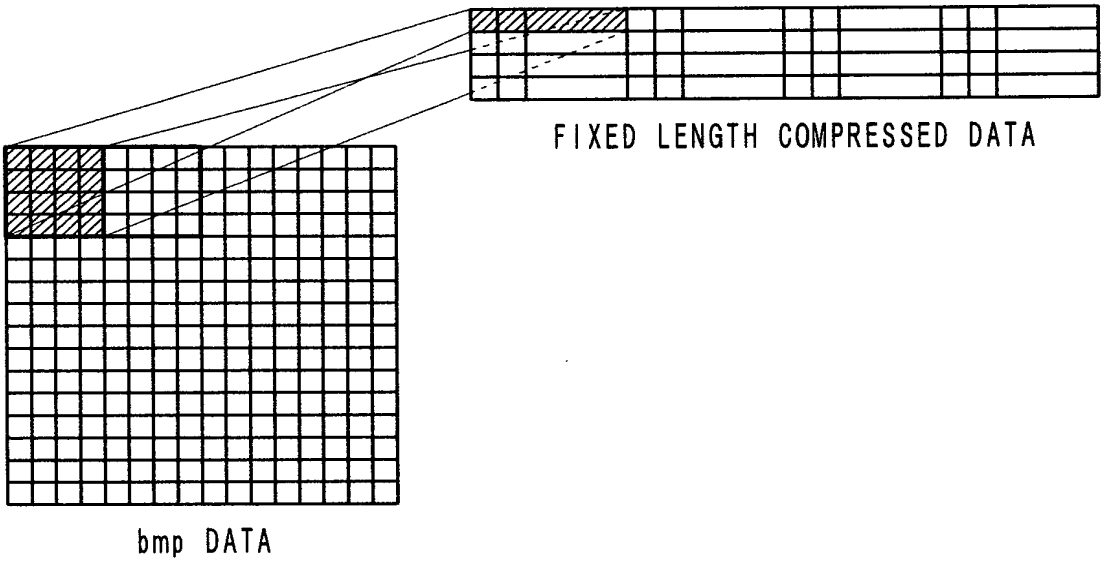

LA
LD
φ0
φ1
- - -
φe
φf
8bit
8bit
32bit (2bit ×16)

FIG. 5



F I G. 6

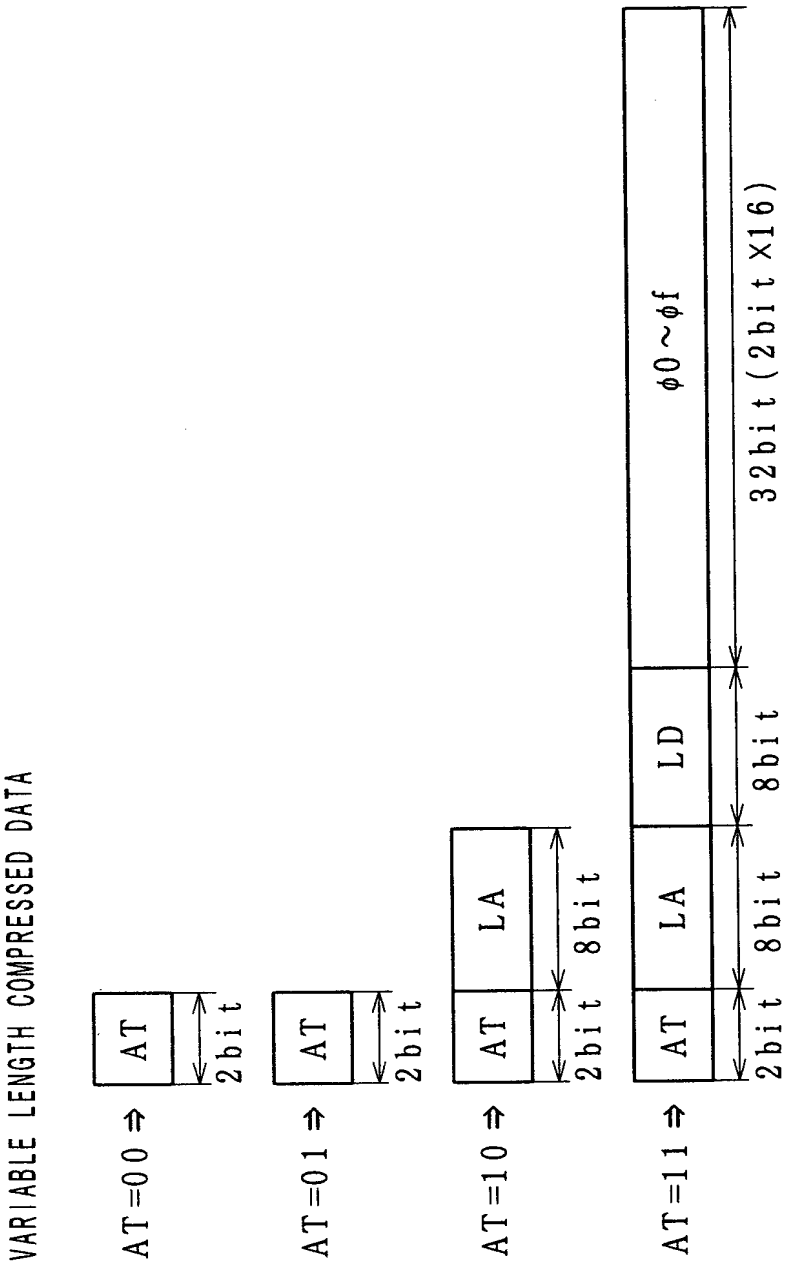

VARIABLE LENGTH COMPRESSED DATA
AT=00 ⇒
AT
2bit
AT=01 ⇒
AT
2bit
AT=10 ⇒
AT
LA
2bit
8bit
AT=11 ⇒
AT
LA
LD
φ0~φf
2bit
8bit
8bit
32bit(2bit×16)

FIG. 7

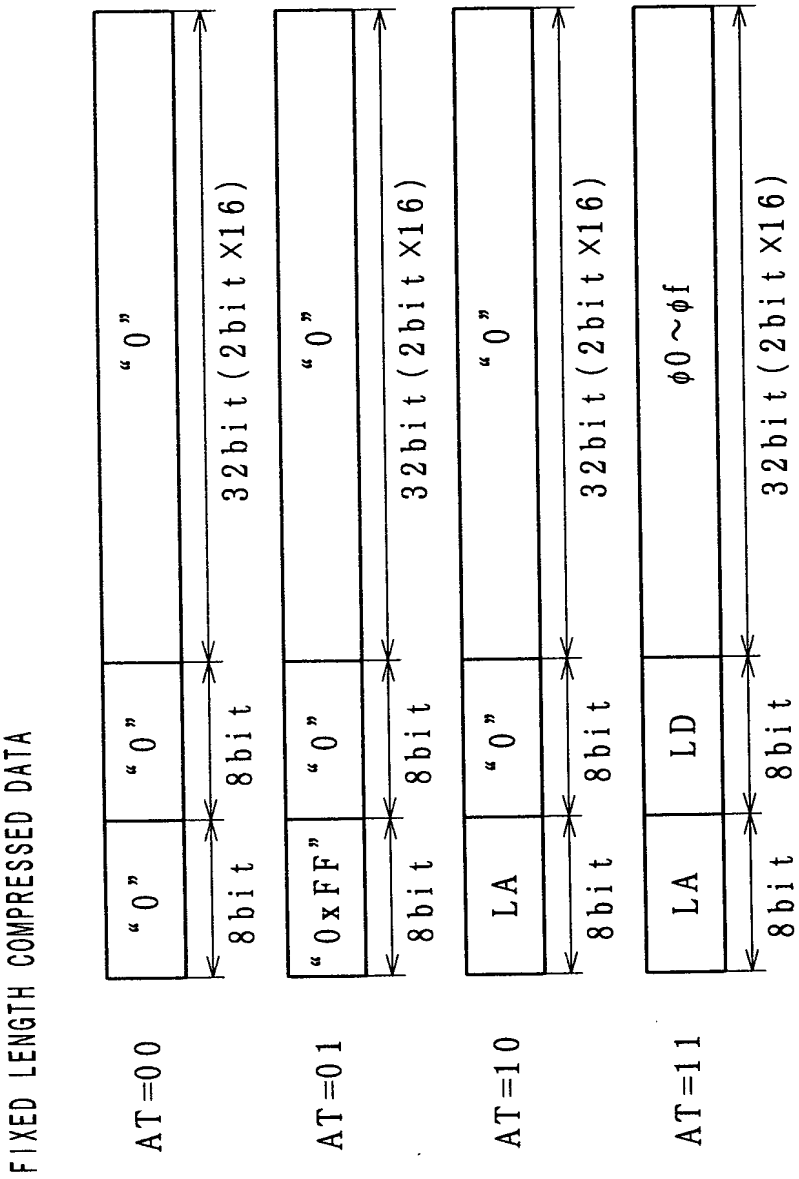

FIXED LENGTH COMPRESSED DATA
AT=00
"0"
"0"
"0"
8bit
8bit
32bit(2bit×16)
AT=01
"0xFF"
"0"
"0"
8bit
8bit
32bit(2bit×16)
AT=10
LA
"0"
"0"
8bit
8bit
32bit(2bit×16)
AT=11
LA
LD
φ0~φf
8bit
8bit
32bit(2bit×16)

FIG. 8a

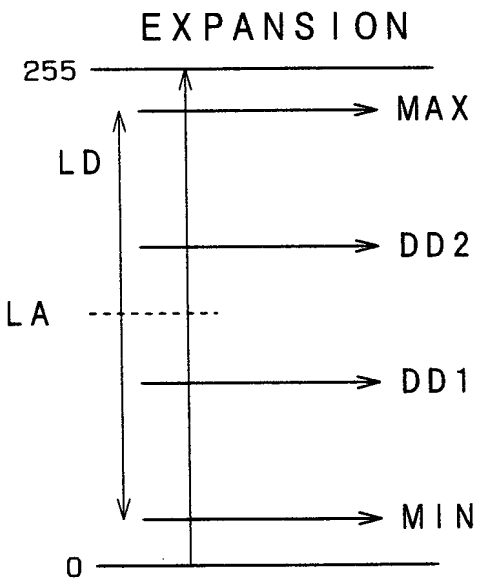

EXPANSION
255
MAX
LD
DD2
LA
DD1
MIN
0

FIG. 8b

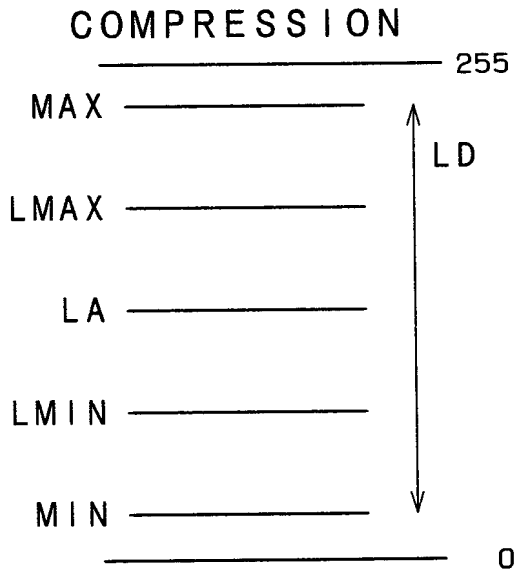

COMPRESSION
255
MAX
LD
LMAX
LA
LMIN
MIN
0

FIG. 9

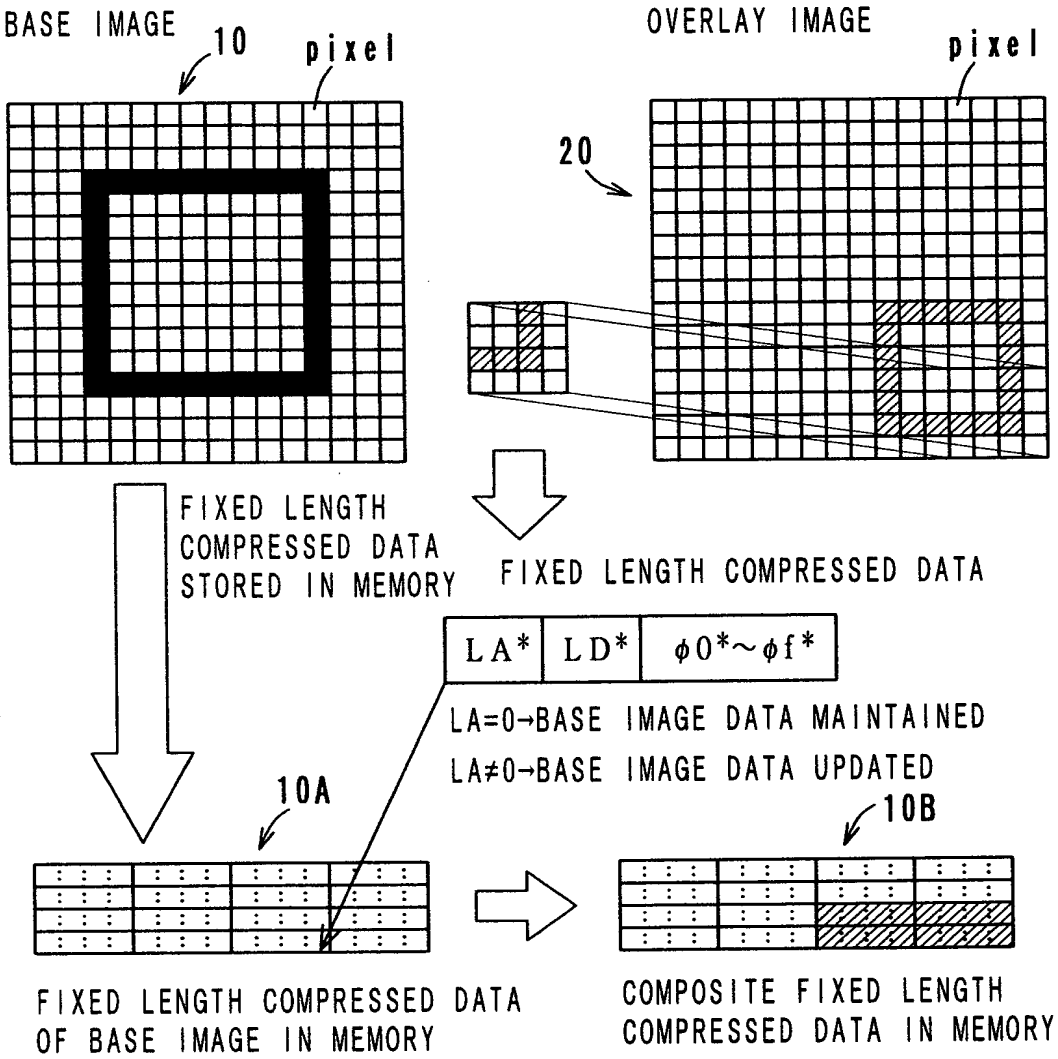

BASE IMAGE
10
pixel
OVERLAY IMAGE
pixel
20
FIXED LENGTH COMPRESSED DATA STORED IN MEMORY
FIXED LENGTH COMPRESSED DATA
LA*
LD*
φ0*~φf*
LA=0→BASE IMAGE DATA MAINTAINED
LA≠0→BASE IMAGE DATA UPDATED
10A
10B
FIXED LENGTH COMPRESSED DATA OF BASE IMAGE IN MEMORY
COMPOSITE FIXED LENGTH COMPRESSED DATA IN MEMORY

FIG. 10

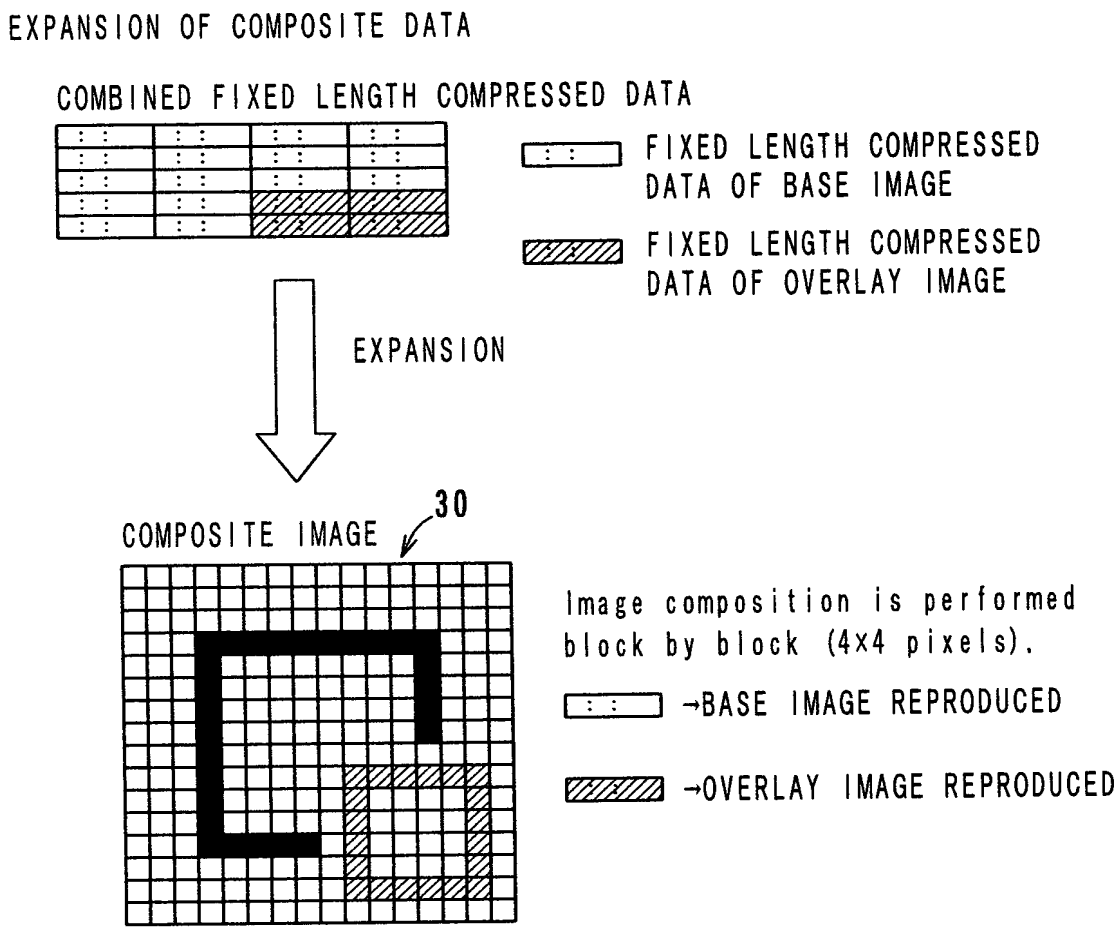

EXPANSION OF COMPOSITE DATA
COMBINED FIXED LENGTH COMPRESSED DATA
FIXED LENGTH COMPRESSED DATA OF BASE IMAGE
FIXED LENGTH COMPRESSED DATA OF OVERLAY IMAGE
EXPANSION
COMPOSITE IMAGE
30
Image composition is performed block by block (4x4 pixels).
→BASE IMAGE REPRODUCED
→OVERLAY IMAGE REPRODUCED

FIG. 11

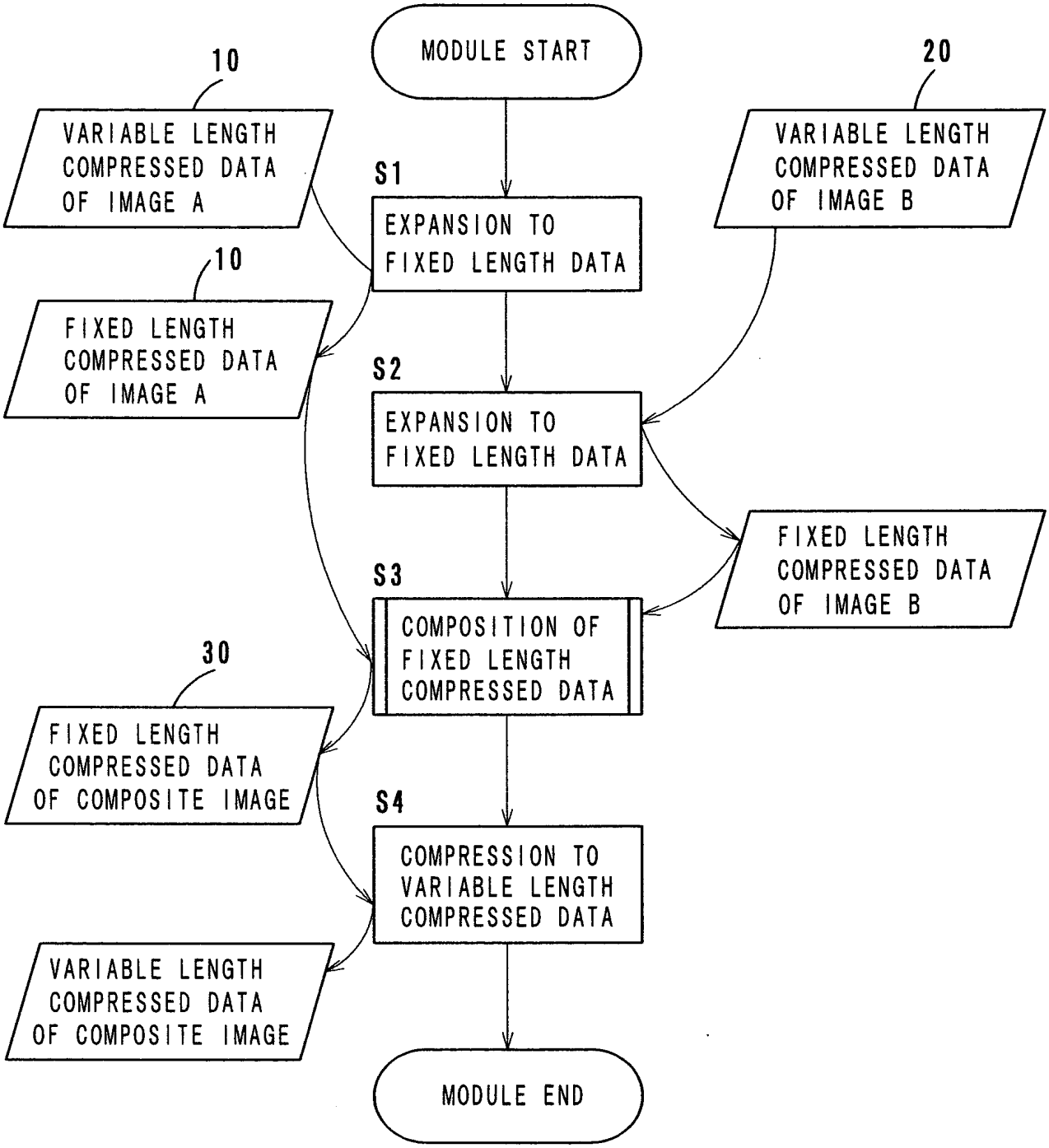
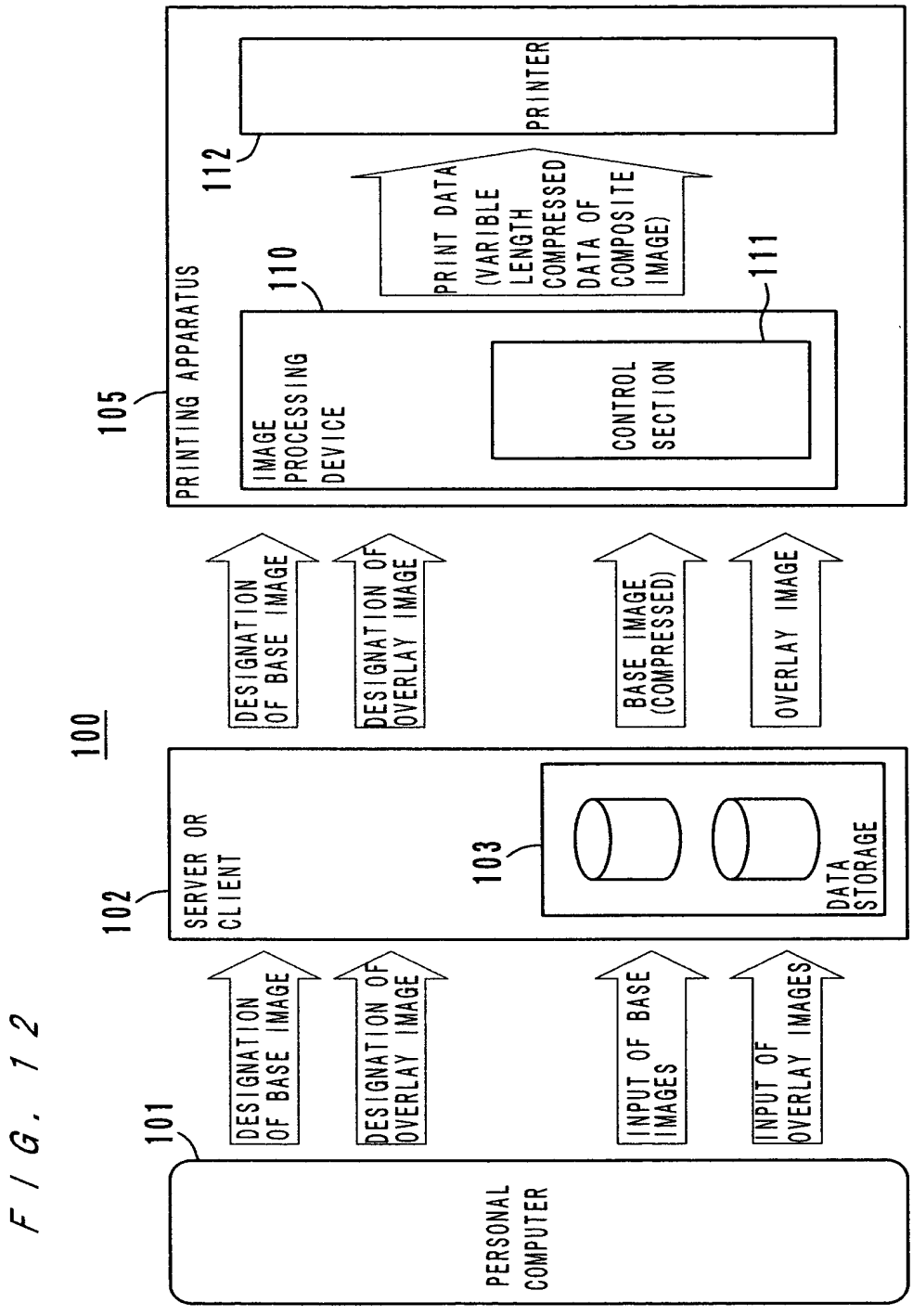

MODULE START
10
VARIABLE LENGTH COMPRESSED DATA OF IMAGE A
20
VARIABLE LENGTH COMPRESSED DATA OF IMAGE B
S1
EXPANSION TO FIXED LENGTH DATA
10
FIXED LENGTH COMPRESSED DATA OF IMAGE A
S2
EXPANSION TO FIXED LENGTH DATA
FIXED LENGTH COMPRESSED DATA OF IMAGE B
S3
COMPOSITION OF FIXED LENGTH COMPRESSED DATA
30
FIXED LENGTH COMPRESSED DATA OF COMPOSITE IMAGE
S4
COMPRESSION TO VARIABLE LENGTH COMPRESSED DATA
VARIABLE LENGTH COMPRESSED DATA OF COMPOSITE IMAGE
MODULE END

FIG. 12


100
101
PERSONAL COMPUTER
DESIGNATION OF BASE IMAGE
DESIGNATION OF OVERLAY IMAGE
INPUT OF BASE IMAGES
INPUT OF OVERLAY IMAGES
102
SERVER OR CLIENT
103
DATA STORAGE
DESIGNATION OF BASE IMAGE
DESIGNATION OF OVERLAY IMAGE
BASE IMAGE (COMPRESSED)
OVERLAY IMAGE
105
PRINTING APPARATUS
110
IMAGE PROCESSING DEVICE
111
CONTROL SECTION
PRINT DATA (VARIBLE LENGTH COMPRESSED DATA OF COMPOSITE IMAGE)
112
PRINTER

F I G. 1 3

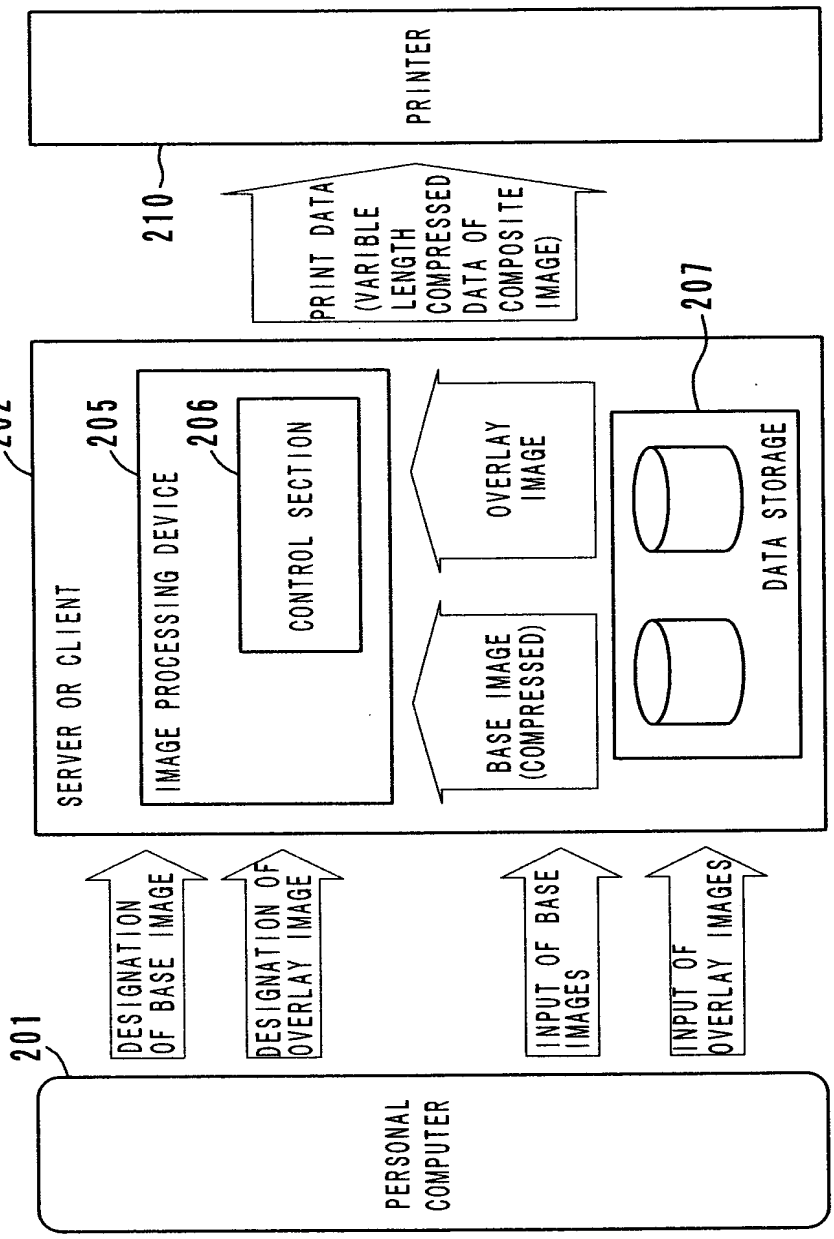

200
PRINTER
210
PRINT DATA (VARIBLE LENGTH COMPRESSED DATA OF COMPOSITE IMAGE)
207
202
205
206
SERVER OR CLIENT
IMAGE PROCESSING DEVICE
CONTROL SECTION
OVERLAY IMAGE
BASE IMAGE (COMPRESSED)
DATA STORAGE
DESIGNATION OF BASE IMAGE
DESIGNATION OF OVERLAY IMAGE
INPUT OF BASE IMAGES
INPUT OF OVERLAY IMAGES
201
PERSONAL COMPUTER

FIG. 14

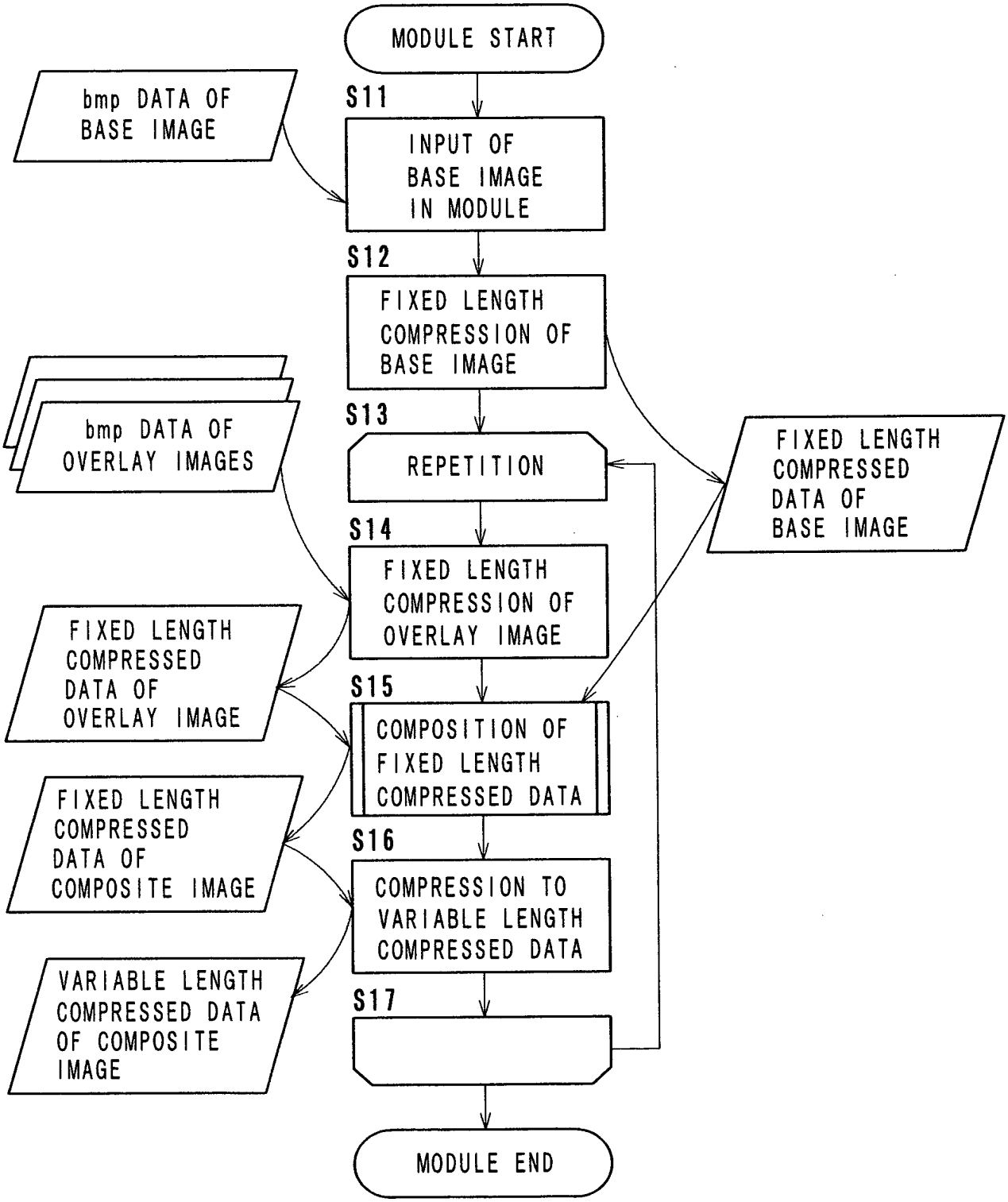

MODULE START
bmp DATA OF BASE IMAGE
S11
INPUT OF BASE IMAGE IN MODULE
S12
FIXED LENGTH COMPRESSION OF BASE IMAGE
bmp DATA OF OVERLAY IMAGES
S13
REPETITION
FIXED LENGTH COMPRESSED DATA OF BASE IMAGE
S14
FIXED LENGTH COMPRESSION OF OVERLAY IMAGE
FIXED LENGTH COMPRESSED DATA OF OVERLAY IMAGE
S15
COMPOSITION OF FIXED LENGTH COMPRESSED DATA
FIXED LENGTH COMPRESSED DATA OF COMPOSITE IMAGE
S16
COMPRESSION TO VARIABLE LENGTH COMPRESSED DATA
VARIABLE LENGTH COMPRESSED DATA OF COMPOSITE IMAGE
S17
MODULE END

FIG. 15

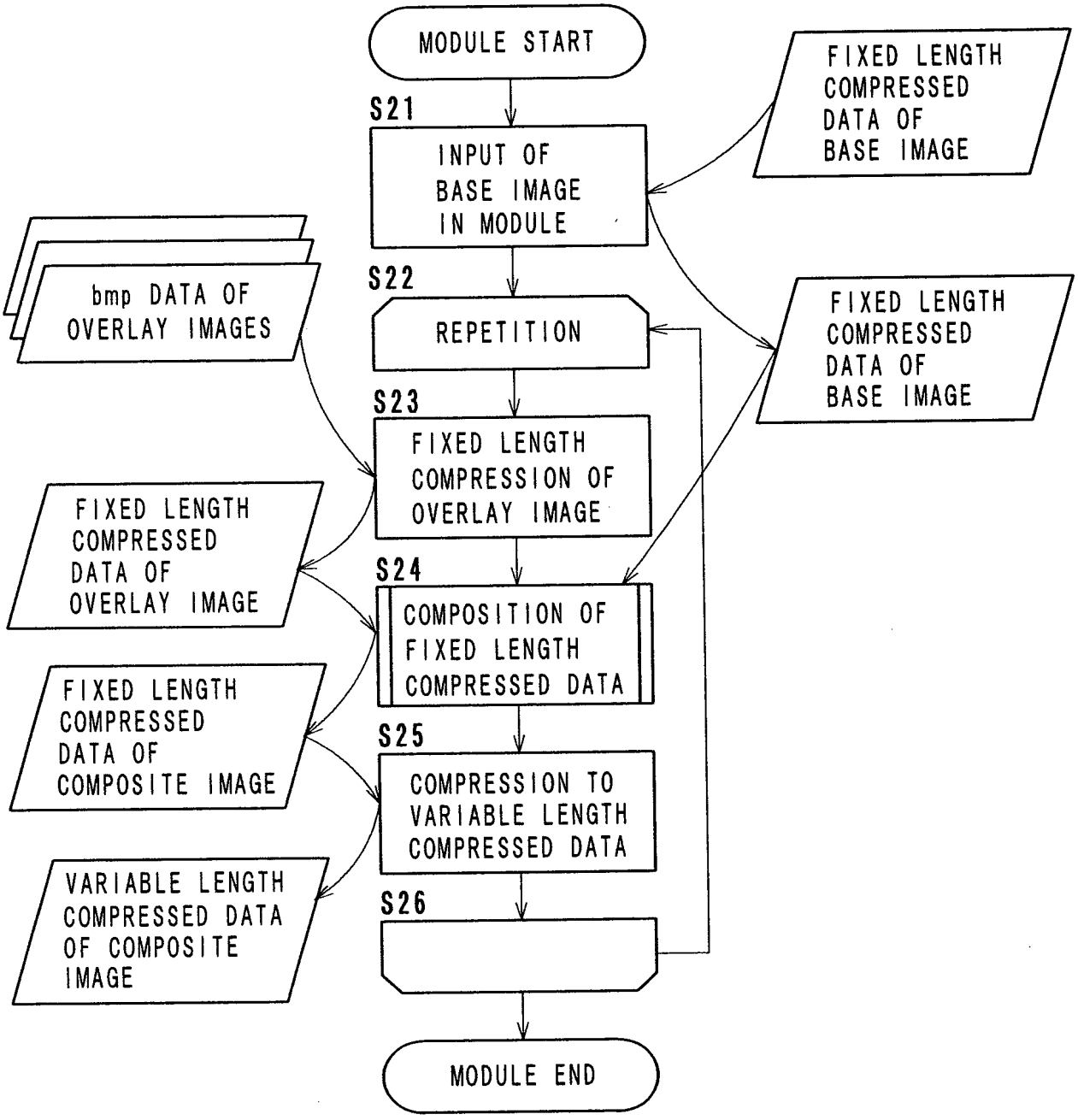
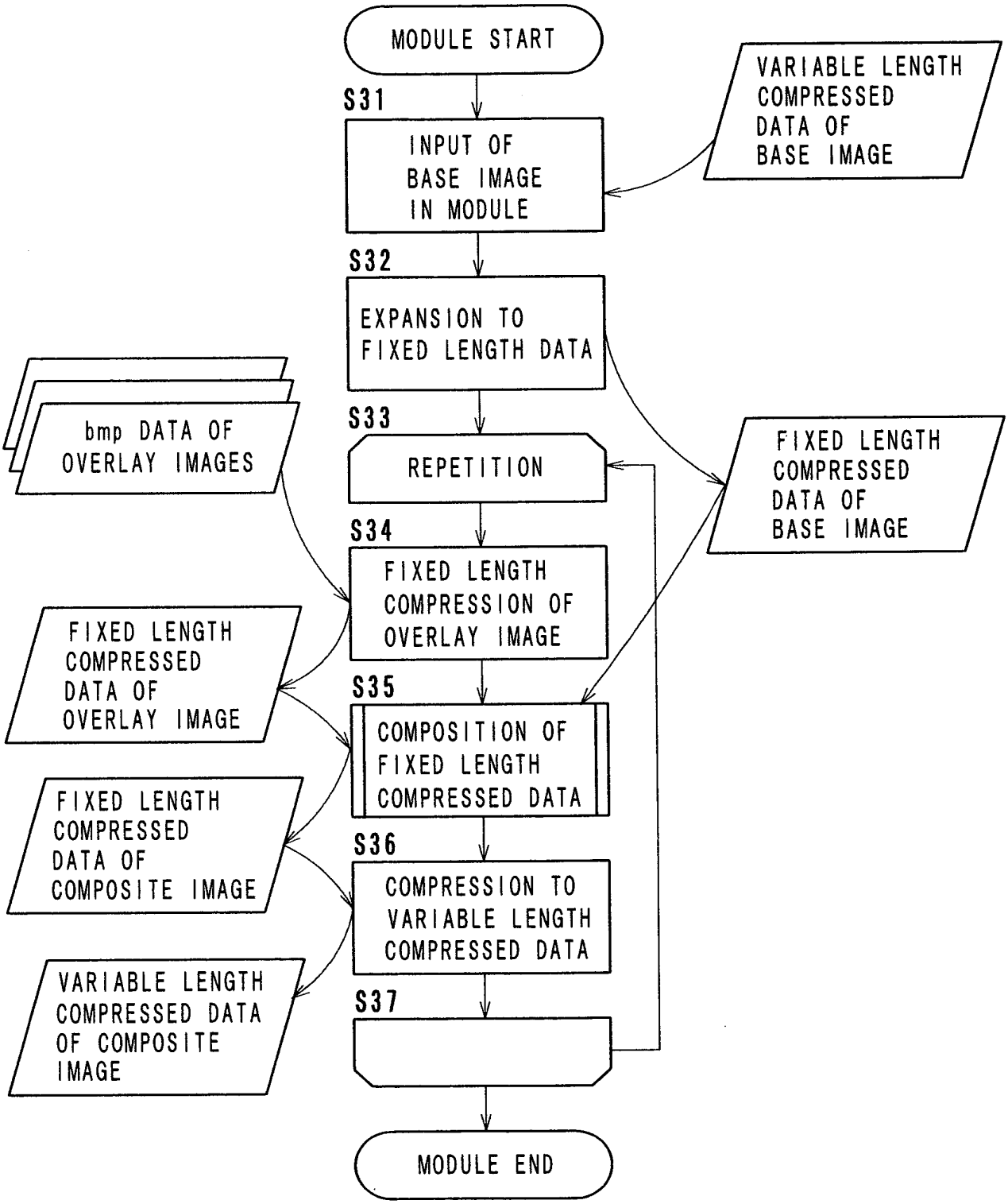

MODULE START
S21
INPUT OF BASE IMAGE IN MODULE
FIXED LENGTH COMPRESSED DATA OF BASE IMAGE
bmp DATA OF OVERLAY IMAGES
S22
REPETITION
FIXED LENGTH COMPRESSED DATA OF BASE IMAGE
S23
FIXED LENGTH COMPRESSION OF OVERLAY IMAGE
FIXED LENGTH COMPRESSED DATA OF OVERLAY IMAGE
S24
COMPOSITION OF FIXED LENGTH COMPRESSED DATA
FIXED LENGTH COMPRESSED DATA OF COMPOSITE IMAGE
S25
COMPRESSION TO VARIABLE LENGTH COMPRESSED DATA
VARIABLE LENGTH COMPRESSED DATA OF COMPOSITE IMAGE
S26
MODULE END

FIG. 16


MODULE START
S31
INPUT OF BASE IMAGE IN MODULE
VARIABLE LENGTH COMPRESSED DATA OF BASE IMAGE
S32
EXPANSION TO FIXED LENGTH DATA
bmp DATA OF OVERLAY IMAGES
S33
REPETITION
FIXED LENGTH COMPRESSED DATA OF BASE IMAGE
S34
FIXED LENGTH COMPRESSION OF OVERLAY IMAGE
FIXED LENGTH COMPRESSED DATA OF OVERLAY IMAGE
S35
COMPOSITION OF FIXED LENGTH COMPRESSED DATA
FIXED LENGTH COMPRESSED DATA OF COMPOSITE IMAGE
S36
COMPRESSION TO VARIABLE LENGTH COMPRESSED DATA
VARIABLE LENGTH COMPRESSED DATA OF COMPOSITE IMAGE
S37
MODULE END

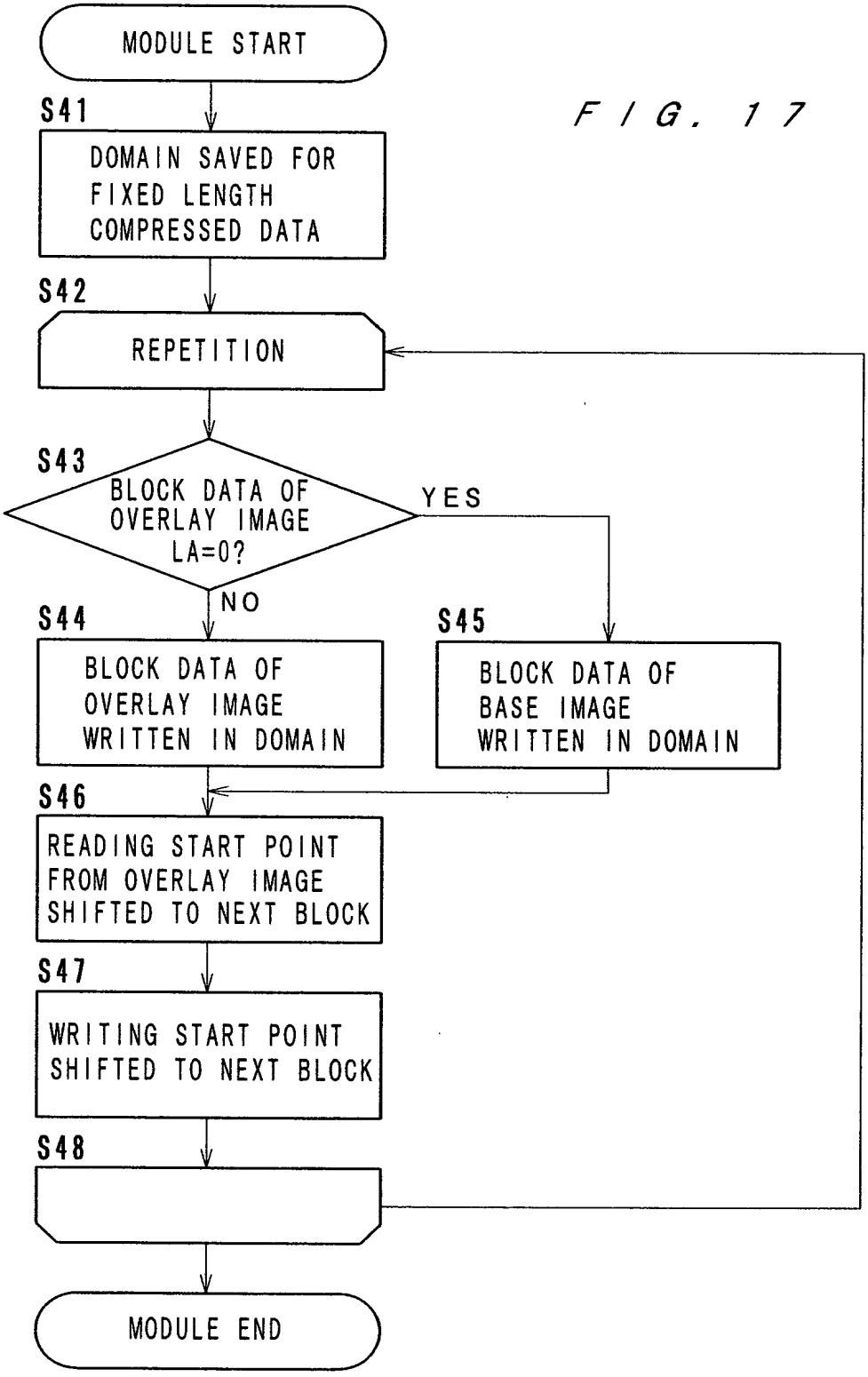
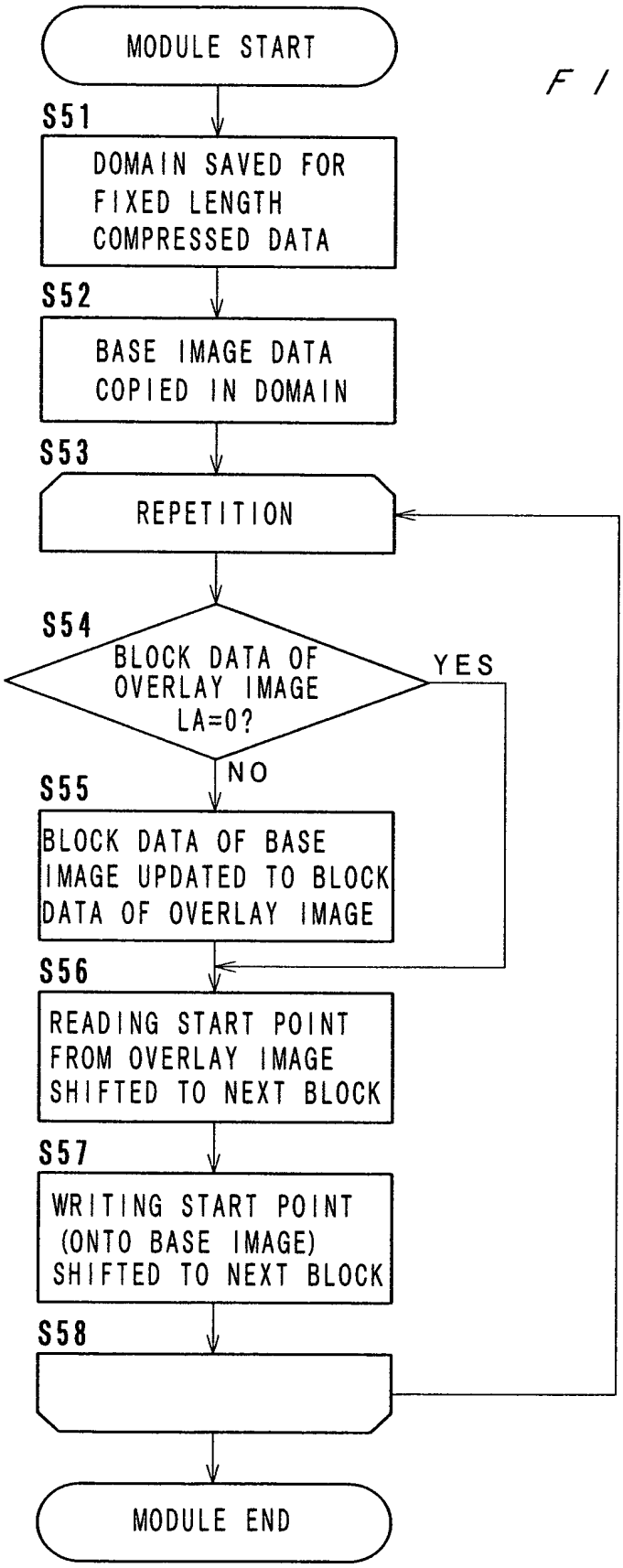

MODULE START
S41
DOMAIN SAVED FOR FIXED LENGTH COMPRESSED DATA
S42
REPETITION
S43
BLOCK DATA OF OVERLAY IMAGE LA=0?
YES
NO
S44
BLOCK DATA OF OVERLAY IMAGE WRITTEN IN DOMAIN
S45
BLOCK DATA OF BASE IMAGE WRITTEN IN DOMAIN
S46
READING START POINT FROM OVERLAY IMAGE SHIFTED TO NEXT BLOCK
S47
WRITING START POINT SHIFTED TO NEXT BLOCK
S48
MODULE END

FIG. 17

FIG. 18


MODULE START
S51
DOMAIN SAVED FOR FIXED LENGTH COMPRESSED DATA
S52
BASE IMAGE DATA COPIED IN DOMAIN
S53
REPETITION
S54
BLOCK DATA OF OVERLAY IMAGE LA=0?
YES
NO
S55
BLOCK DATA OF BASE IMAGE UPDATED TO BLOCK DATA OF OVERLAY IMAGE
S56
READING START POINT FROM OVERLAY IMAGE SHIFTED TO NEXT BLOCK
S57
WRITING START POINT (ONTO BASE IMAGE) SHIFTED TO NEXT BLOCK
S58
MODULE END